Trigonometry

Wednesday, May 17, 2023 12:00 PM

$x \to ?$

$\sin x$,

$1^\circ = \frac{\pi}{180}$ radian

$\pi/180 \to 1^\circ$

$1 \to \frac{180}{\pi}^\circ$

$\pi/8 \to \left(\frac{180}{\pi} \times \frac{\pi}{8}\right)^\circ =$

$45/2 \overline{)45(22\frac{1}{2}}$

$\frac{44}{1}$

$\sin(10\sqrt{3})$

$\mathbb{N} = \{1, 2, 3, \dots\}$

$\mathbb{W} = \{0, 1, 2, 3, \dots\}$

$\mathbb{Q} = \{$ set of all fractions in p/q form, where $q \neq 0, p, q \in \mathbb{Z}\}$

$\mathbb{Z} = -\mathbb{N} \cup \{0\} \cup \mathbb{N}$

$\mathbb{Q}^c = \{$ not rational $\}$

$\mathbb{R} = \mathbb{Q} \cup \mathbb{Q}^c$

$\mathbb{C}$ = Complex number

sin, cos, tan real-valued functions

$f(x) = \frac{1}{1-x}$

Angles of a triangle are in AP. $\frac{\text{least angle (degree)}}{\text{greatest angle (radian)}} = \frac{60}{\pi}$. Find angles.

$(a-d)^\circ, a^\circ, (a+d)^\circ$ $\quad a = 60^\circ$

greatest $= 60+d = \frac{\pi}{180}(60+d)$ rad

$\therefore \frac{60-d}{\pi/180(60+d)} = \frac{60}{\pi} \Rightarrow \frac{60-d}{60+d} = \frac{1}{3} \Rightarrow 180-3d = 60+d \Rightarrow d = 30^\circ$

Angles of a quadrilateral are in AP, greatest angle is 120°. Find the $\angle$s (in rad)

$a-3d, a-d, a+d, a+3d$, $\therefore a = 90^\circ$ (Sum of 4 angles of a quadrilateral $= 360^\circ$)

$\Rightarrow 90+3d = 120^\circ \Rightarrow d = 10^\circ$

$\therefore$ 4 angles $\to$ $60^\circ, 80^\circ, 100^\circ$ & 120° . In radians $\to \frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$

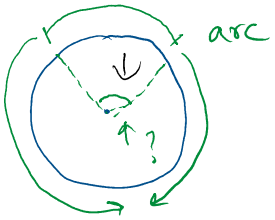
The minute hand of a clock is 10 cm long. How far does the tip of the hand move in 20 mins?

$2\pi(10)$ cm distance covered in 60 mins

60 mins $\to 20\pi$ cm

20 mins $\to \frac{20\pi}{3}$ cm

Circle with radius 21 cm. Has an arc that subtends 60° angle at the center. Find arc length.



Sol1

$1/6$ ($360^\circ \to 42\pi$ cm) $1/6$

$60^\circ \to 7\pi$ cm

Arc length $= \frac{22}{7} \times 7$ cm $= 22$ cm

Sol2

$s = r\theta$, where s = arc length, r = radius, θ = angle at center by the arc, (in rad)

$s = \left(21 \times \frac{\pi}{3}\right)$ cm $= 7\pi$ cm $= 22$ cm